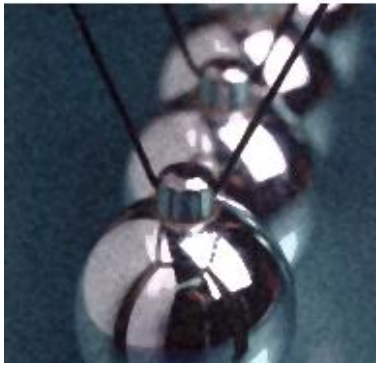


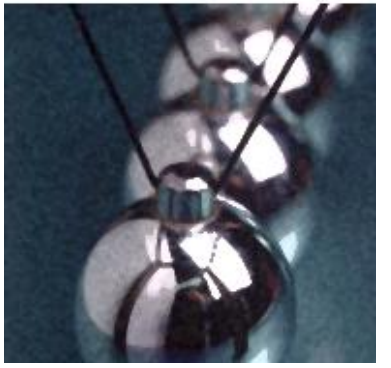
The State of STEM and High Demand K-12 Initiatives: Virginia and the Nation

Presentation to the
Degree Attainment Committee of the
Higher Education Commission
Hampton University
August 31, 2010

Dr. Linda Wallinger
Assistant Superintendent for Instruction
Virginia Department of Education

Foundations of STEM Education in Virginia

- Rigorous Standards
- Aligned Curriculum
- Assessment of Knowledge and Skills
- Quality Teachers
- Professional Development
- Additional Policy Actions To Support STEM
- Collaboration Between K-12 and Higher Education and the Business Community



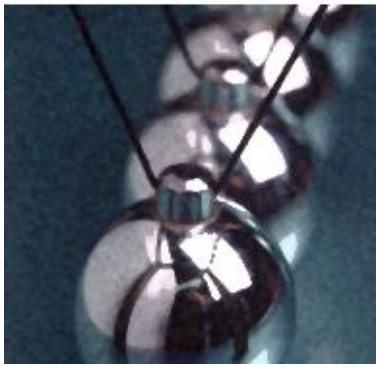
Rigorous Standards

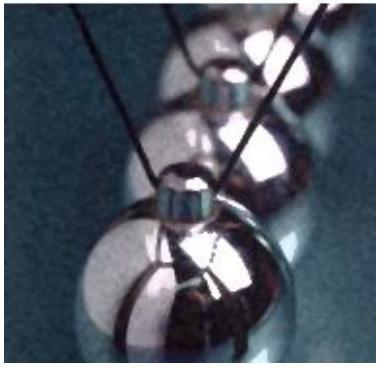
- Regular review of Standards of Learning (SOL) Content
- Regular review of Career and Technical Education (CTE) Competencies
- Development of Curriculum Frameworks
- CTE Resource Center manages VERSO, Virginia's Educational Resource System Online

Aligned Curriculum

Participation in the Achieve American Diploma Project (ADP)

- Virginia's English and Mathematics Standards of Learning have been externally validated as college- and career-ready by Achieve's American Diploma Project (ADP), The College Board, and ACT
- Their analyses showed strong alignment between the Virginia SOL and each group's respective standards for postsecondary readiness.





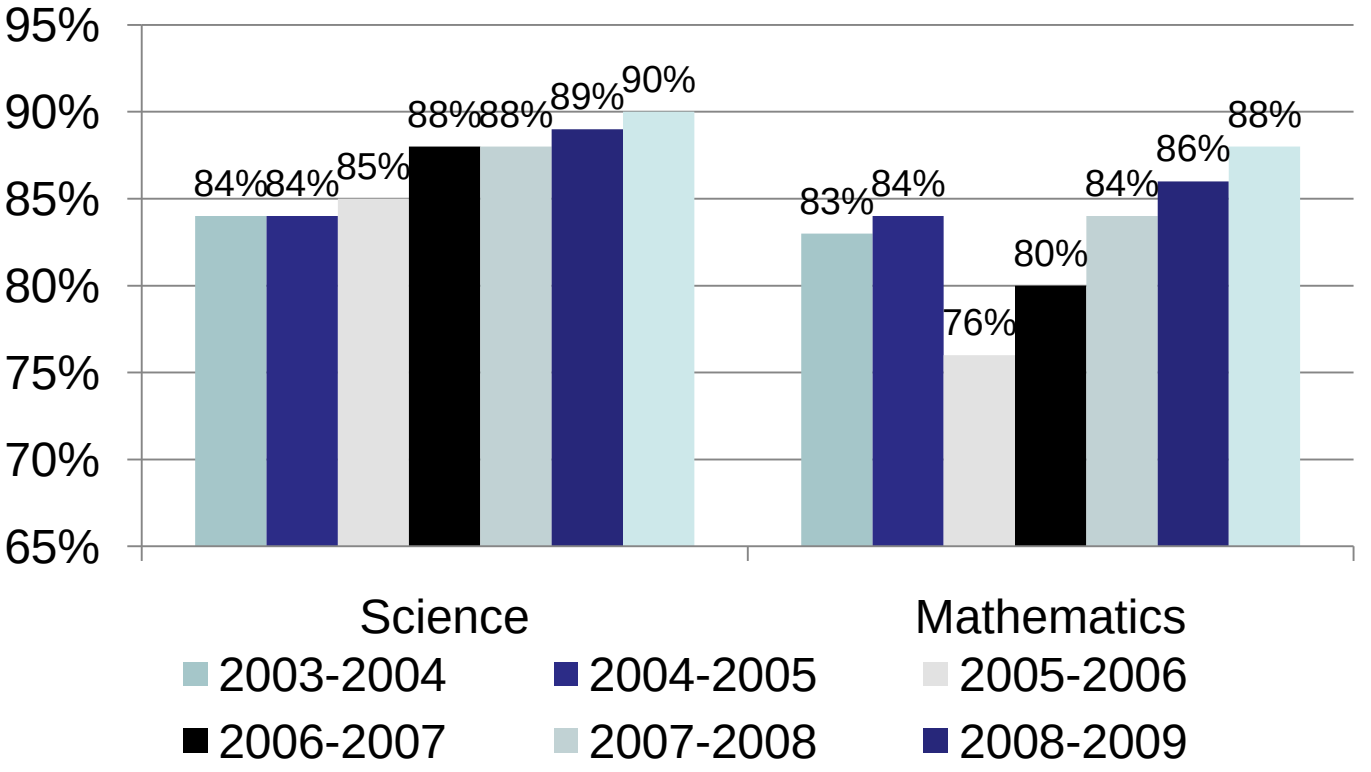
Aligned Curriculum

Virginia's College- and Career-Readiness Initiative

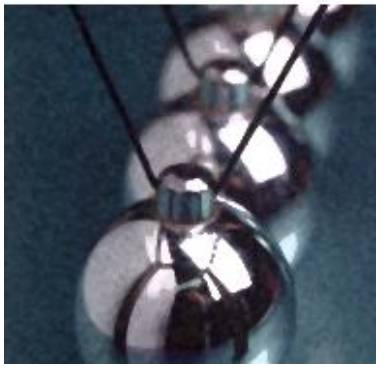
- Designed to (1) ensure that college-ready learning standards in reading, writing, and mathematics are emphasized in every Virginia classroom, and (2) increase students' preparation for college and the work force before leaving high school.
- The work of the initiative includes:
  - Defining standards-based college- and career-ready performance expectations;
  - Developing elective "capstone courses" to support students who need additional instruction to meet these expectations before leaving high school;
  - Providing technical assistance and professional development to Virginia's educators;
  - Defining quantitative indicators of college readiness; and
  - Identifying incentives for schools to increase the percentage of students who graduate from high school with the academic skills needed to be successful in postsecondary education programs.

Assessment of Content and Skills

SOL Test Scores in Science and Mathematics have increased steadily over the last 8 years



*In 2005-2006, new mathematics tests were administered in grades 4, 6, and 7, that tested the grade-level content in more depth.

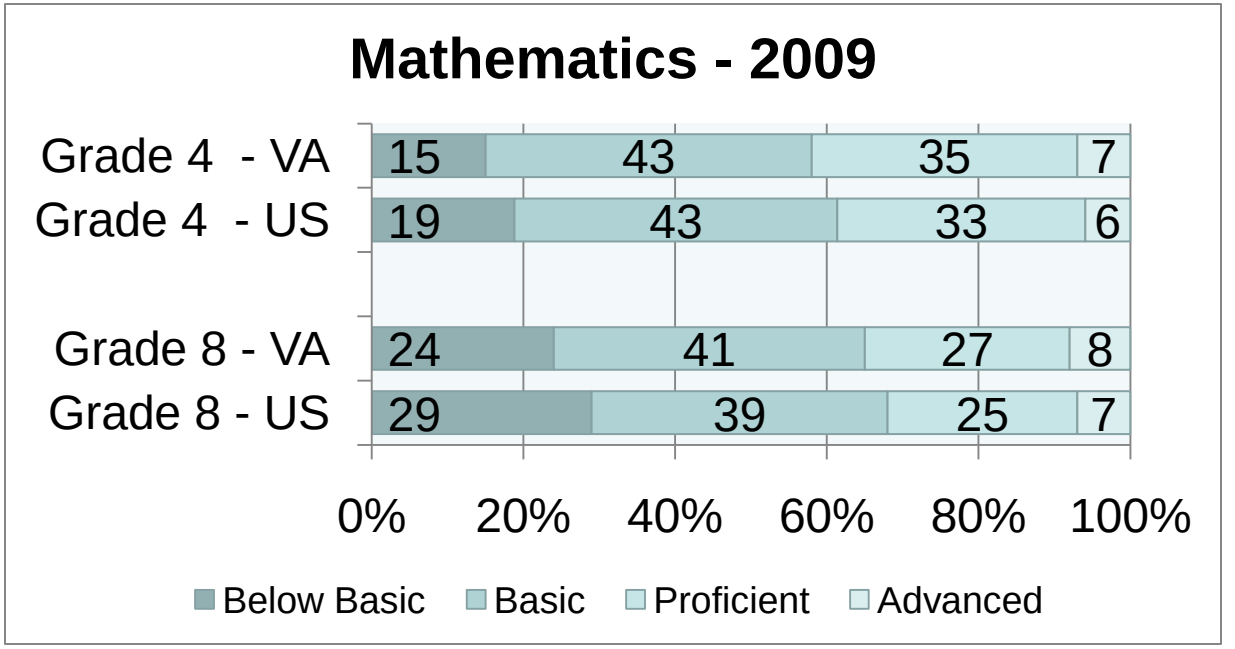


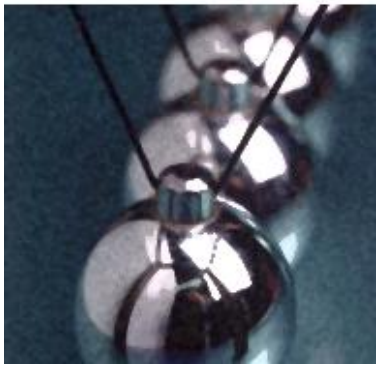
Assessment of Content and Skills

National Assessment of Educational Progress (NAEP)

In 2009, Virginia's students scored higher in mathematics than students nationwide

- Grade 4: 4 points higher (243/239)
- Grade 8: 4 points higher (286/282)



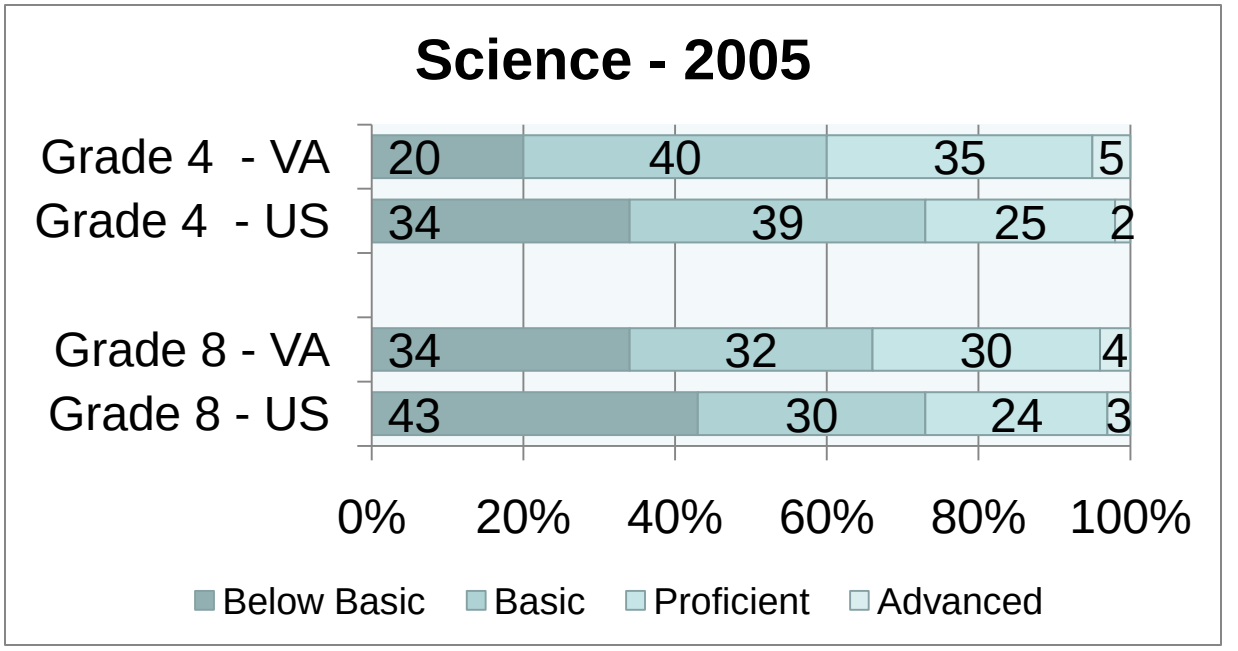


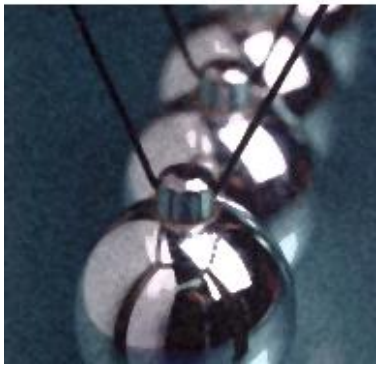
Assessment of Content and Skills

National Assessment of Educational Progress (NAEP)

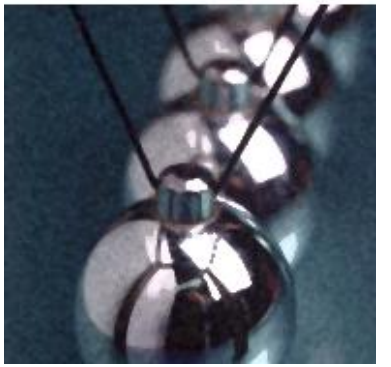
In 2005, Virginia students led the nation in science achievement, exceeding the national average

- Grade 4: 12 points higher (161/149)
- Grade 8: 8 points higher (155/147)





Assessment of Content and Skills



Advanced Placement Tests in Virginia

	2004	2009
Mathematics*		
Total Tests Taken	1,738	10,206
Total Scores 3 or Above	1,279	6,523
Science*		
Total Tests Taken	2,829	15,085
Total Scores 3 or Above	1,849	7,651

*__Mathematics__ includes Calculus AB and Calculus B/C. __Science__ includes Biology, Chemistry, Environmental Science, Physics B and Physics C.

Assessment of Content and Skills

Industry Credentials Earned by Virginia High School Students

	2009	2010
# Students Attempting an Industry Credential Examination	30,691	41,464
# Students Passing an Industry Credential Examination	19,842	27,103

The Virginia Board of Education has approved over 350 external examinations for technical skills assessment in CTE. The examinations include state licensures, occupational competency assessments, and industry certification examinations.

Quality Teachers

- K-8 Mathematics Specialist Endorsement
  - Designed to provide highly trained teacher specialists who can assist other teachers in providing quality mathematics instruction in grades K – 8 by modeling effective teaching practices and assisting with remediation of students.

- Virginia Middle School Mathematics Teacher Corps
  - Supports the recruitment and retention of teachers in mathematics for middle schools identified as “at risk in mathematics”

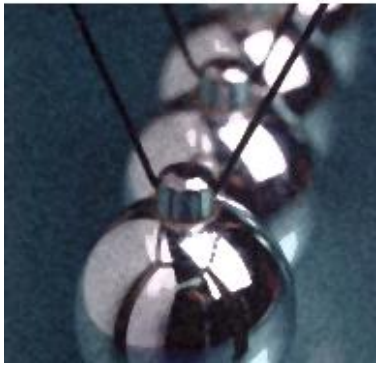
- Virginia Teaching Scholarship Loan Program
  - Intended to increase the number of teacher candidates pursuing careers in critical shortage teaching endorsement areas

Professional Development

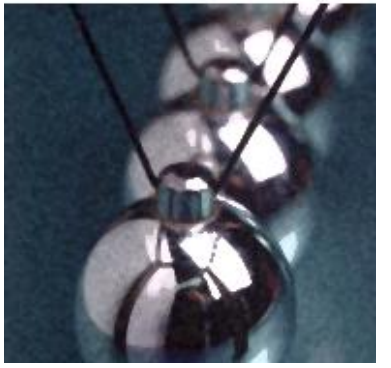
- DOE-sponsored institutes related to the 2008 *Mathematics Standards of Learning* and the 2009 *Science Standards of Learning*
- Collaboration with professional organizations and other state agencies to deliver high-quality professional development
- DOE-sponsored opportunities for CTE teachers to earn industry credentials

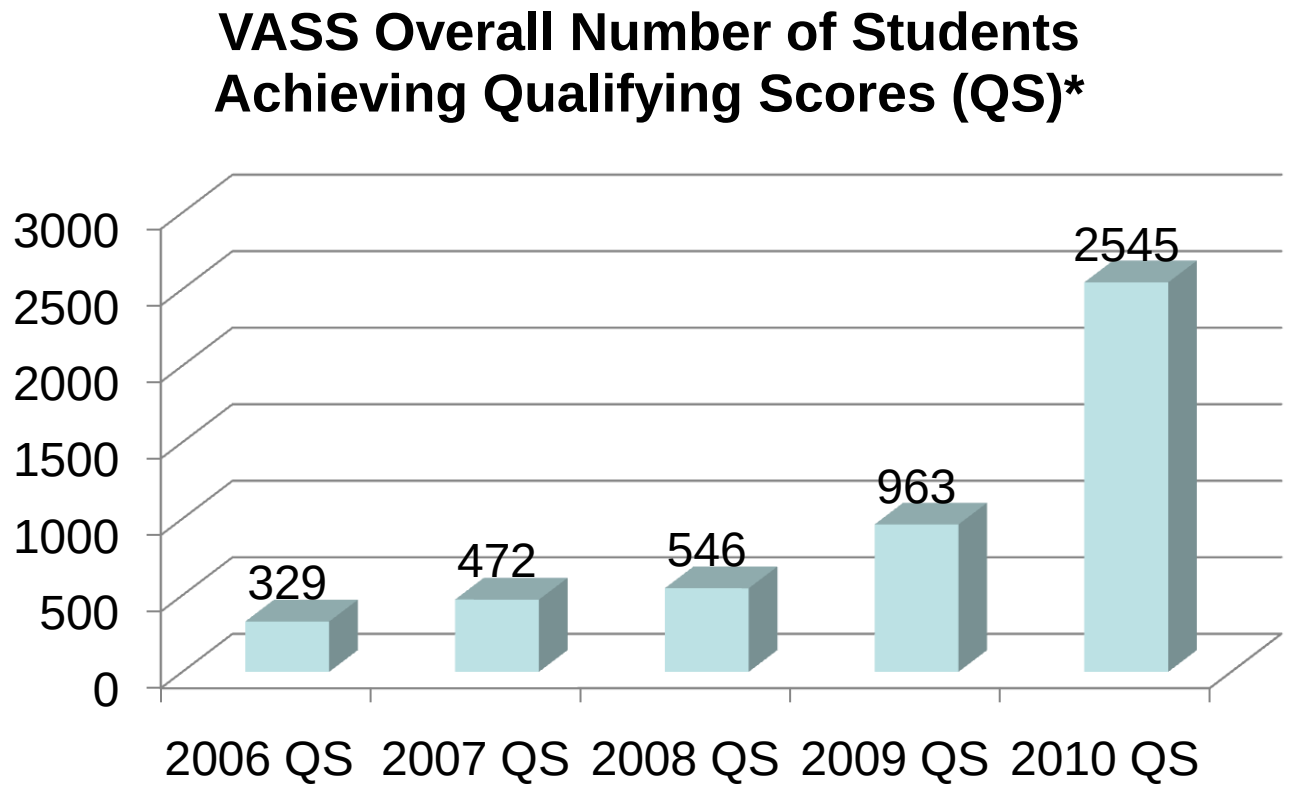
Virginia Advanced Study Strategies (VASS)

- Encourages high school students in the Commonwealth to prepare for careers in mathematics and science by enrolling in challenging Advanced Placement classes
- Provides training for teachers in curriculum, instruction and assessment to help them prepare for the AP classes and tests
- Collaborates with Virginia universities to link college professors and resources with the AP classes
- Provides incentives for AP teachers and students to accept the extra challenge of these rigorous programs



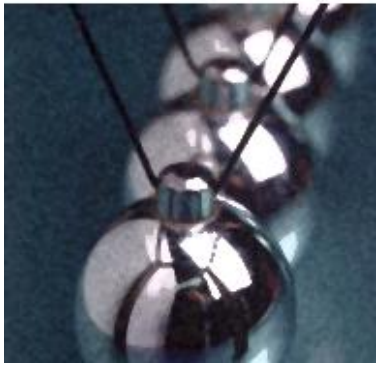
Virginia Advanced Study Strategies (VASS)



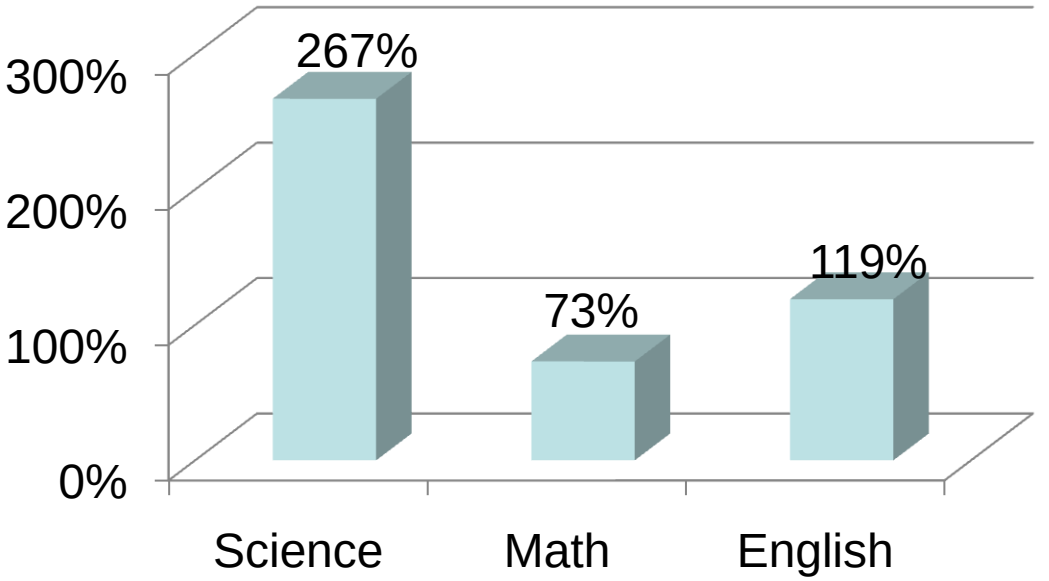


*On a 5-point scale, a qualifying score is 3 or above.

Virginia Advanced Study Strategies (VASS)



Increase in VASS AP Scores 3 or Greater for the First Two Years



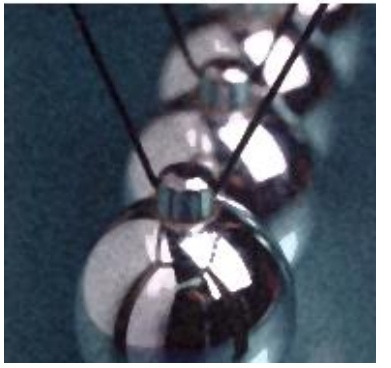
Additional Policy Actions to Support STEM

- Increased Graduation Requirements To Support STEM
- Increased Rigor in Courses to Satisfy Mathematics Requirements
- Technical Diplomas
- Academic and Career Plans
- Diploma Seals
- Early College Scholars Recognition
- Commonwealth Scholars Recognition

Collaboration Between K-12, Higher Education and the Business Community

- Virginia Mathematics and Science Coalition
  - An alliance of education, corporate, and public policy leaders working together to revitalize mathematics and science education in prekindergarten through graduate school

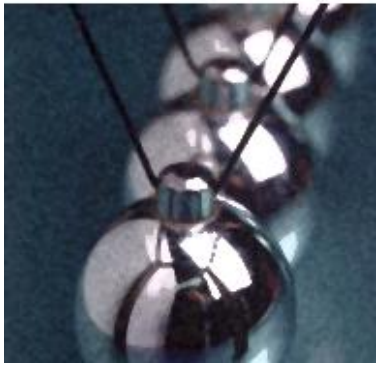
- Mathematics and Science Partnerships
  - Intended to encourage institutions of higher education and schools/school divisions to participate in professional development activities that increase subject matter knowledge and teaching skills of mathematics and science teachers



Collaboration Between K-12, Higher Education and the Business Community

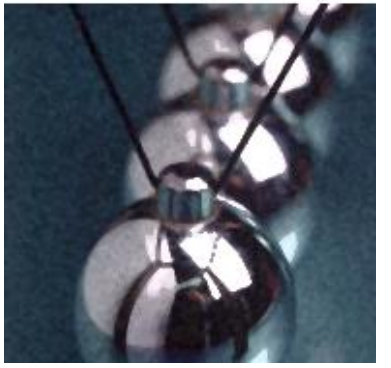
- Developmental Mathematics Redesign Team
  - The Department of Education participates as a partner on the VCCS team to redesign developmental courses in mathematics in an attempt to reduce the amount of time a student must spend in developmental courses before he or she can enroll in credit-bearing mathematics courses.

- Governor's Career and Technical Academies (STEM Academies)
  - Partnerships among school divisions, postsecondary institutions and business and industry designed to expand options for students to acquire STEM literacy and other critical skills, knowledge and credentials to prepare them for high-demand, high-wage, and high-skill careers in Virginia.



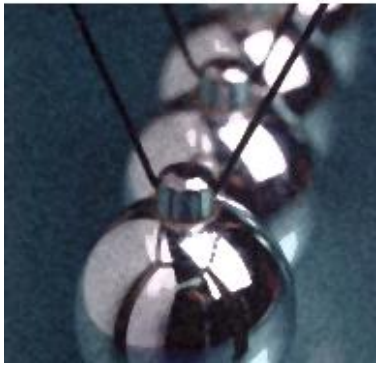
Virginia's Participation in the Common Core State Standards

- The Virginia Board of Education is committed to the Virginia Standards of Learning (SOL) program and opposed to adoption of the newly developed Common Core State Standards as a prerequisite for participation in federal competitive grant and entitlement programs.
- The Standards of Learning are clear and rigorous and have won the acceptance and trust of Virginia educators.
  - If necessary, adjustments can be made to align the SOL with the Common Core State Standards.
- Additional reasons to support the SOL program include:
  - Virginia's system of accountability and support is founded on the Standards of Learning.
  - The subtle differences between the SOL and the Common Core do not justify the disruption that would occur in instruction, accountability, professional development and teacher preparation.



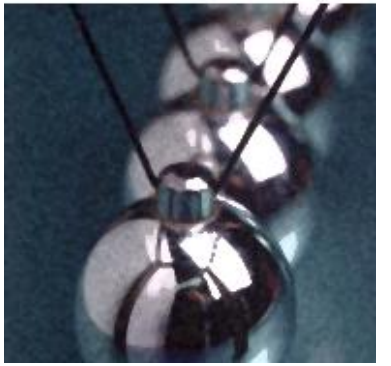
Virginia's Participation in the Common Core State Standards

- The Commonwealth is in the process of implementing recently revised SOL in English and mathematics that meet national benchmarks for college- and career-ready content.
- The revised English and mathematics SOL and the Common Core are comparable in content and rigor.
- Teachers would be without curriculum frameworks, scope and sequence guides and other materials specifically aligned with the standards.
- Virginia's accountability program is built on a validated assessment system aligned with the SOL; validated assessments aligned with the Common Core do not exist.
- Virginia's investment in the Standards of Learning since 1995 far exceeds the $250 million Virginia potentially could have received by abandoning the SOL and competing in phase two of Race to the Top.



National STEM Initiatives and STEM Initiatives in Other States

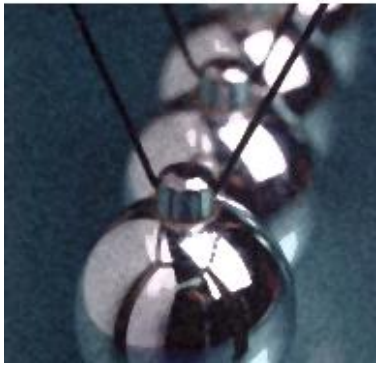
President's Council of Advisors on Science and Technology (PCAST)



- An advisory group of the nation's leading scientists and engineers who directly advise the President on policies and recommendations in areas where an understanding of science, technology, and innovation is key to strengthening our economy and forming policy that works.
- Has a STEM Education Working Group that is engaged in developing recommendations to improve mathematics and science teaching and learning in grades K-12.
  - Virginia State Superintendent, Dr. Patricia I. Wright serves as a member of the Working Group.
  - Discussions have centered around (i) mathematics and science standards and assessments; (ii) mathematics and science teachers and teaching; (iii) instructional materials and educational technologies; and (iv) STEM governance structures and funding.
  - A consensus report is being developed to present to PCAST and the President, and may be available in Fall 2010.

Investing in STEM to Secure Maryland's Future

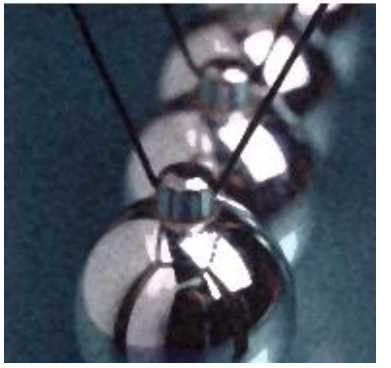
- STEM Task Force created by Governor O'Malley in September 2008
- Asked to create a statewide STEM action plan to:
  - Ensure that rigorous STEM teaching and learning are accessible to all learners at all levels of education;
  - Increase the number of degree holders and program completers trained in STEM fields;
  - Include strategies to link education, work force, research, and economic development; and
  - Include measurable goals, benchmarks, and resources required to implement the plan



Investing in STEM to Secure Maryland's Future

The Task Force offered seven recommendations in its report to Governor O'Malley in August 2009:

1. Align P-12 STEM curriculum with college requirements and workplace expectations in order to prepare all students for postsecondary success.
2. Triple the number of teachers in STEM shortage areas who are prepared in Maryland programs, increase their five-year retention rate from an estimated 50% to 75%, and enhance the STEM preparation and aptitudes for elementary and early childhood teachers.



Investing in STEM to Secure Maryland's Future

3. Ensure that all P-20 mathematics and science teachers have the knowledge and skills to help all students successfully complete the college- and career-ready curriculum.
4. Provide STEM internships, co-ops, or lab experiences for all interested high school and college students to jump-start their successful transition to the workplace.
5. Increase the number of STEM college graduates by 40% from the present level of 4,400 graduates by 2015.
6. Boost Maryland's global competitiveness by supporting research and entrepreneurship.
7. Create Maryland's STEM Innovation Network to make STEM resources available to all.

Tennessee STEM Innovation Network

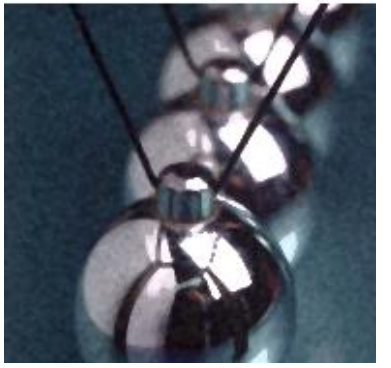
- Created with an Executive Order by Governor Bredesen on July 29, 2010
- Charged with promoting and expanding the teaching and learning of STEM education in K-12 public schools
- Project housed in the Tennessee Department of Education
  - Funded by Tennessee's Race to the Top grant
  - Taps into resources of the Oak Ridge National Laboratory, with research in STEM areas and Battelle Memorial Institute, a global research and development enterprise, with national recognition in STEM education
- Establishes the 24-member Tennessee STEM Advisory Council to advise the Department and Battelle on the operation of the Network

Tennessee STEM Innovation Network

- Will conduct various STEM activities in coordination with school districts, including
  - Teacher professional development
  - Curriculum development
- Will develop at least two STEM platform schools with a focus on STEM curriculum and postsecondary work.
  - In addition, a virtual STEM school, with online courses and dual enrollment opportunities, will be created and available statewide.
- Will establish regional STEM hubs across the state to support STEM schools, professional development and teaching practices regionally

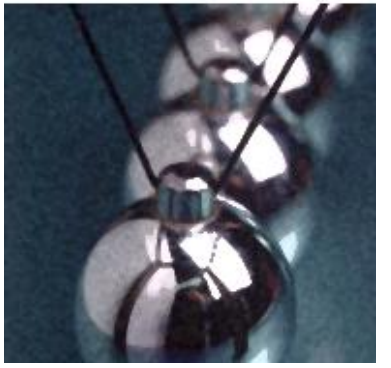
Considerations for Improving Virginia's K-12 STEM Programs

1. Complete the College- and Career-Ready Initiative backed by SREB and establish policies on the use of SOL college-ready scale scores in lieu of college placement exams for students who have qualifying scores.
2. Ask the Virginia Board of Education to establish a K-8 STEM specialist licensure endorsement similar to the K-8 mathematics specialist endorsement, which has received national recognition.
3. Establish an early admissions or automatic policy for high school juniors or seniors who earn an "Early College Mathematics and Science Scholar" recognition. The recognition would be a modification of the current Early College Scholar recognition.
4. Require school divisions to release students, upon request, from compulsory school-age attendance requirements upon completion of the state's advanced studies diploma requirements and acceptance into postsecondary education.



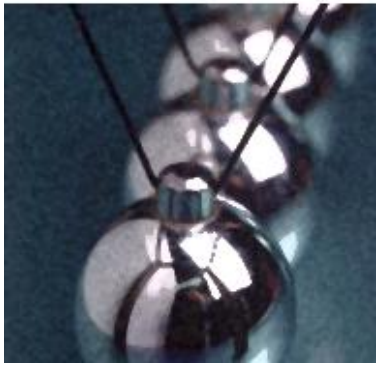
Considerations for Improving Virginia's K-12 STEM Programs

5. Expand the Virginia Middle School Teacher Corps to include highly effective middle and high school mathematics and science teachers and create a pay for performance compensation model to reward them for student achievement gains.
6. Seek private sector funding to establish one or more UTeach programs in Virginia to increase the pool of mathematics and science teachers.
7. Encourage a Virginia university to establish an "Early College Mathematics and Science Lab School" as authorized in the College Partnership Laboratory School legislation passed by the 2010 General Assembly.
8. Expand Virtual Virginia AP course offerings in STEM areas and ask universities to award degree-earning college credits when qualifying scores are earned on AP exams.
9. Encourage summer institutes for high school teams of mathematics, science, and technology or pre-engineering teachers to receive professional development and work experience related to applications of STEM in the real world.



Considerations for Improving Virginia's K-12 STEM Programs

10. Establish a Governor's STEM challenge (contest or awards program) for middle and/or high school students to work in teams to research, design, and use technology to solve problems of interest (i.e., project-based learning). Have projects judged regionally and at the state level and make Governor's awards.
11. Establish STEM Professional Development and Innovation Centers to assist teachers with the acquisition of knowledge, skills and resources for helping students become STEM literate.
12. Encourage all students to take the Preliminary SAT/National Merit Qualifying Test (PSAT/NMQT), a standardized test that provides firsthand practice for the SAT, offers students a chance to enter NMSC scholarship programs and gain access to college and career planning tools, and helps schools identify students who are likely to succeed in Advanced Placement courses.



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